

## GLOSSARY

a	丙辰 ; 安政	g	圓理術
b	測量集成	h	順天堂
c	花井健吉	i	數理精蘊
d	福田理軒	j	律曆淵源
e	門田福高	k	梅穀成
f	西村常吉	l	何國宗

## ON THE INFLUENCE OF KIRCHER IN SPAIN

By Thomas F. Glick\*

The reception of "modern" astronomical and physical ideas in seventeenth-century Spain was retarded by official and ecclesiastical opposition to Copernican doctrine. A small group of scholars, derisively called *novatores* by their detractors, was nevertheless able to transcend the severe limitations imposed upon the academic community and to renovate substantially the practice of astronomy in Spain.<sup>1</sup> In this effort

Athanasius Kircher's role was significant, because the *novatores* depended on the support, interest, and mediation of a relatively small number of foreigners in order to overcome their isolation. In spite of the modesty of his own scientific achievements (or perhaps because of it) Kircher acted as a vital nexus of scientific communication in seventeenth-century Europe. His broad-ranging interests and infectious enthusiasm would have been enough to have attracted the attention of the Spanish *novatores*; and, because he was a Jesuit, his influence and importance in Spain were relatively greater than elsewhere.

Thus Kircher numbered among his correspondents the three leading astro-

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<sup>1</sup> On the renovation of mathematics, physics, and astronomy in 17th-century Spain, see J. M. López Piñero, *La introducción de la ciencia moderna en España* (Barcelona:Ediciones Ariel, 1969), pp. 128-169.

nomical novatores, two of whom are imperfectly identified in John E. Fletcher's recent article.<sup>2</sup> The first, "Don Vincentius Mutz," is Vicente Mut (1612–1687), a Mallorcan engineer, mathematician, and astronomer. One of the best practical astronomers in Spain, Mut studied the Pleiades, the diameter of the sun, and the determination of the meridians by deduction from the study of eclipses. He proposed that the trajectories of comets were not perfectly rectilinear, but in the form of parabolic curves, a better explanation than Kepler's and one which placed Mut among the antecedents of Newton.<sup>3</sup>

The second novator, "Jean Caramuel de Lobkowitz," is Juan Caramuel y Lobkowitz (1606–1682), of Bohemian and Flemish origins, but born in Madrid and educated at the Alcalá de Henares.<sup>4</sup> A Cistercian and also Bishop of Campagne-Satriano in the Kingdom of Naples, he resided outside of Spain during most of his adult life. Nevertheless, his importance in Spanish science is great, precisely because he was one of the few novatores who was able to move unencumbered in the mainstream of European society. His influence among the other novatores was substantial, and his works were among the prime conduits for the diffusion of Cartesian ideas in Spanish America.<sup>5</sup>

Caramuel was no distant correspondent but a close personal friend of Kircher's. Their interesting correspondence, ranging over a variety of astronomical, mathematical, and personal

topics between 1644 and 1672, has been published,<sup>6</sup> and it was through his association with Kircher that Caramuel became part of what Ramón Ceñal characterizes as the "Cartesian orbit."<sup>7</sup> This revelation of Caramuel's place in the net of scientific communication does much to alter the received view of Spain's scientific isolation during its century of greatest decadence. Observing, for example, that Caramuel's notes on eclipses in 1645 and 1647 were transmitted by Wendelin to Gassendi,<sup>8</sup> one becomes aware of his locus close to the center of contemporary European astronomy.

A third novator, not mentioned by Fletcher but also a correspondent of Kircher's, was the Jesuit José de Zaragoza (1627–1679).<sup>9</sup> An assiduous observer of comets, Zaragoza published his observations of the comet of 1677 in the *Journal des Savants*. In the realm of theory, Zaragoza was as much a Copernican as it was safe to be in Spain at the time. Although he felt obliged to reject the reality (although not the *possibility*) of the Copernican system, Zaragoza nevertheless accepted it implicitly as the basis for the rest of his astronomical thinking. Zaragoza not only corresponded with Kircher but utilized his works as well. The entire twelfth chapter of his encyclopedic treatise *Esphera en común, celeste y terráquea* (Madrid, 1675) is based on Kircher's peculiar *Mundus subterraneus...* (Amsterdam, 1665), a discussion of the interior of the earth. From Kircher, Zaragoza cites data on volcanos and also a description of a species of "subterranean man."<sup>10</sup>

A final Spanish correspondent of

<sup>2</sup> John E. Fletcher, "Astronomy in the Life and Correspondence of Athanasius Kircher," *Isis*, 1970, 61:52–67.

<sup>3</sup> *Ibid.*, p. 62; Armando Cotarelo Valledor, "El P. José de Zaragoza y la astronomía de su tiempo," *Estudios sobre la ciencia española del siglo XVII* (Madrid: Gráfica Universal, 1935), p. 103.

<sup>4</sup> Fletcher, p. 63; on the importance of Caramuel, see López Piñero, pp. 131–136.

<sup>5</sup> On Caramuel's influence in Argentina, see Guillermo Furlong, S.J., *Historia social y cultural del Río de la Plata, 1536–1810. El trasplante cultural: ciencia* (Buenos Aires: Tipografía Editora Argentina, 1969), pp. 166–167.

<sup>6</sup> Ramón Ceñal, S.J., "Juan Caramuel. Su epistolario con Atanasio Kircher, S.J.," *Revista de Filosofía* (Madrid), 1953, 12:101–147.

<sup>7</sup> *Ibid.*, p. 111.

<sup>8</sup> *Ibid.*, p. 133, n. 2.

<sup>9</sup> On the importance of Zaragoza, see López Piñero, pp. 137–144, and Cotarelo. The reference to his correspondence with Kircher is Ceñal, p. 121, n. 66.

<sup>10</sup> Cotarelo, pp. 192–193.

Kircher's was Vicente de Lastanosa, a polymath and scientific amateur from Huesca who owned a famous museum and library and shared Kircher's interest in scientific instruments.<sup>11</sup>

Kircher's ideas continued to be disseminated in enlightened Spain. The encyclopedist Benito Feijóo cited him on a variety of scientific problems.<sup>12</sup> I suggest, however, that the primary significance of Kircher in Spain was his role in the communication of direct scientific observation to and from Spanish scientists. The separation of Spain from Europe—the lamentable result of the counter-reformist mentality—produced

not an impermeable barrier, but rather a screening effect. Not all foreign books and ideas were screened out; and some Spaniards managed to stay in touch with European science, or selected elements thereof. But one of the effects of the screening process, which typified Spanish science in its most decadent period, was that new ideas tended to enter the country by circuitous routes, often through the works of second-line scientists or popularizers. Kircher's relationship to the Spanish astronomers is an example of the phenomenon and puts into sharper focus the distinctive attributes of Spain's scientific isolation.

<sup>11</sup> Citations of correspondence with Lastanosa in the *Carteggio Kircher*: Cefal, p. 121, n. 66. On Lastanosa, see Cotarelo, pp. 101–102.

<sup>12</sup> Benito Feijóo, *Teatro crítico universal*, 8 vols. (Madrid: Blas Román, 1781), Vol. IV, Disc. 3, No. 12, on Kircher's efforts to discover a perpetual lamp by the use of oil chemically extracted from asbestos; Vol. VIII, Disc. 10, No. 198, on Kircher's agreement with those who believed that contagious diseases proceed from

various species of insects. *Cartas erúditas y curiosas*, 5 vols. (Madrid: Blas Román, 1781), Vol. I, Carta 42, No. 22, on Kircher's belief that all fables had their origin in the language of Egyptian hieroglyphic script; Vol. II, Carta 13, Nos. 60–61, on Kircher's high regard for Lull's *Ars magna*; (in para. 60 Feijóo remarks that he does not have Kircher's work at hand); Vol. V, Disc. 2, No. 37, more on Kircher's assertion of the generation of disease by insects.

## ON *EOZOÏN CANADENSE*

By M. E. Mitchell\*

In his recent article on *Eozoön canadense*, Charles F. O'Brien refers to the joint paper which King and Rowney published in 1866, as representing the earliest opposition to the views of Dawson and Carpenter.<sup>1</sup> In fact, in a letter dated June 3, and published in the *Reader* June 10, 1865, King and Rowney state "It is now our conviction that all the

parts, in Serpentine, which have been taken for the skeleton-structures of a foraminifer are nothing more than the effect of crystallization and segregation."<sup>2</sup>

Professor O'Brien's assertion that the controversy began "with relatively good humor and with full faith and credit given to the observations and intentions

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<sup>1</sup> Charles F. O'Brien, "*Eozoön canadense*, 'The Dawn Animal of Canada,'" *Isis*, 1970, 61: 206–223; on p. 208. William King and T. H. Rowney, "On the So-called 'Eozoöna Rock,'" *Quarterly Journal of the Geological Society of London*, 1866, 22: 185–218.

<sup>2</sup> William King and Thomas H. Rowney, Letter to Editor, *Reader*, 1865, 5: 660. This letter is reprinted in W. King and T. H. Rowney, *An Old Chapter of the Geological Record with a new Interpretation: or, Rock-Metamorphism (especially the methylosed kind) and its Resultant Imitations of Organisms. With an Introduction giving an Annotated History of the Controversy on the so-called "Eozoön Canadense," and an Appendix.* (London: John Van Voorst, 1881), p. xii.